

PED 4126

Due March 12, 2010

University of Ottawa

**SPH4U: PHYSICS
GRADE 12
EXAM**

Intended to be written on March 19, 2010 at 1pm

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Section	Types of Questions	Marks
A:	5 Multiple Choice	
	Q1	1
	Q2	1
	Q3	1
	Q4	1
	Q5	1
B:	5 Extended Questions	
	Q1	7
	Q2	5
	Q3	5
	Q4	5
	Q5	4
		Total 31

Worth 10% of your marks

Duration Time 45 minutes to an hour

Part A: Multiple Choice

1 mark for each question

1. You are whirling a rubber stopper of mass m , attached to a string, in a vertical circle at a high constant speed. At the top of the circle, the net force that causes acceleration is [1]
 - (a) horizontal and greater in magnitude than mg
 - (b) horizontal and lower in magnitude than mg
 - (c) vertically downward and greater in magnitude than mg
 - (d) vertically downward and lower in magnitude than mg
 - (e) vertical and equal in magnitude to mg

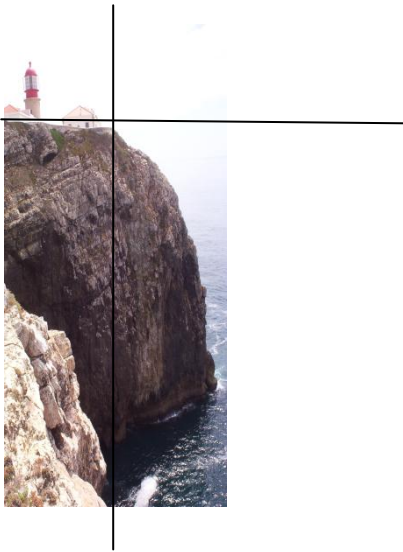
2. If you were to climb a ladder that was your height, the work you would do against the force of gravity is approximately[1]
 - (a) 10^1 J
 - (b) 10^2 J
 - (c) 10^3 J
 - (d) 10^4 J
 - (e) 10^5 J

3. When comparing the force of attraction between an electron and a proton due to the electric force and gravity, it can be concluded that[1]
 - (a) the gravitational force is a lot stronger
 - (b) the electric force is lot stronger
 - (c) the two types of forces are the same
 - (d) they cannot be compared
 - (e) the electric force is slightly stronger

4. Colors are often observed when gasoline is poured onto water. This effect is primarily produced by[1]
 - (a) diffraction
 - (b) diffuse reflection
 - (c) interference
 - (d) absorption
 - (e) incandescence

5. When investigating β decay, the neutrino was postulated to explain[1]
 - (a) conservation of energy and momentum
 - (b) conservation of the number of nucleons
 - (c) counteracting the ionizing effect of radiation
 - (d) the production of antiparticles
 - (e) the energy to carry away the β particle

1. While hiking in the wilderness, you come to a cliff overlooking a river. A topographical map shows that the cliff is 291 m high and the river is 68.5 m wide at that point. You throw a rock directly forward from the top of the cliff, giving the rock a horizontal velocity of 12.8 m/s. Make sure to include a free-body-diagram (FBD) in question (a) and concluding sentences for both (a) & (b) for full marks.
 - (a) Did the rock make it across the river? **[4]**
 - (b) With what velocity did the rock hit the ground or water? **[3]**



2. A forensic expert needed to find the velocity of a bullet fired from a gun in order to predict the trajectory of a bullet. He fired a 5.50g bullet into a ballistic pendulum with a bob that had a mass of 1.75kg. The pendulum swung to a height of 12.5 cm above its rest position before dropping back down. What was the velocity of the bullet just before it hit and became embedded in the pendulum bob? Make sure to include a free-body-diagram (FBD) and a concluding sentence.**[5]**

3. Two parallel plates 5 cm apart are oppositely charged. The electric potential difference across the plates is 80 V.
- (a) What is the electric field intensity between the plates? [1]
 - (b) What is the potential difference at point A? [1]
 - (c) What is the potential difference at point B? [1]
 - (d) What is the potential difference between points A and B? [1]
 - (e) What force would be experienced by a small $2\mu\text{C}$ charge placed at point A? [1]

4. A 5Hz water wave, traveling at 31cm/s in deep water, enters shallow water. The angle between the incident wave front in the deep water and the boundary between the deep and shallow regions is 50° . The speed of the wave in the shallow water is 27cm/s.

Find

- (a) the angle of refraction in the shallow water [2]
- (b) the wavelength in shallow water [3]

5. In a short essay format briefly write about who is known for relativity and what relativity is and state what his famous equation is and about. **[4]**